

Precalc Warm Up # 7- 4

1. If $f(x) = 10x - x^2$, find the domain as the largest subset of positive real numbers, such that the inverse of f is a function.

2. Find the exact domain and range:

$$3x^2 + 3y^2 + 6x - 24y + 43 = 0$$

HW Questions: p. 64

12. Bella set off on a 96 km journey, all the while she maintained a constant speed. On her return she again kept a constant speed but this time increased it by 2 kmh^{-1} , reducing her travel time by 4 hours. What was her original speed?

$t = \text{time in hours}$
 $v = \text{speed in } \frac{\text{km}}{\text{hr}}$

$$rt = 96 \quad (r+2)(t-4) = 96$$

$$t = \frac{96}{r} \quad (r+2)\left(\frac{96}{r} - \frac{4r}{r}\right) = 96$$

$$\cancel{r}(r+2)\left(\frac{96-4r}{\cancel{r}}\right) = 96$$

$$96r - 4r^2 + 192 - 8r = 96r$$

$$-4r^2 - 8r + 192 = 0$$

$$r^2 + 8r - 48 = 0$$

$$(r+12)(r-4) = 0$$

$$r = \cancel{-12}, 4$$

Original
 Speed =
 $4 \frac{\text{km}}{\text{hr}}$

13. The hiring cost for transportation for a class of students was \$144. If two students from a different class were to attend, the cost per student would have decreased by \$1.00. How many students are there in the class? ↖ additional

C = cost in \$ per student

n = number of students

$$cn = 144 \quad (c-1)(n+2) = 144$$

$$c = \frac{144}{n} \quad \left(\frac{144}{n} - \frac{n}{n}\right)(n+2) = 144$$

$$\cancel{n} \left(\frac{144 - \cancel{n}}{\cancel{n}} \right) (n+2) = 144n$$

$$144n + 288 - n^2 - 2n = 144n$$

$$0 = n^2 + 2n - 288$$

$$0 = (n+18)(n-16)$$

$n = -18, 16$ There are 16 students in the original class.

14. A person walked a distance of 4 km at a constant speed of $v \text{ kmh}^{-1}$. If this person increased his speed by 2 kmh^{-1} , the journey would have been reduced by 10 minutes. Find v .

let v = speed in $\frac{\text{km}}{\text{h}}$

t = time in hours

watch out!

$$10 \text{ min} = \frac{1}{6} \text{ hrs}$$

$$vt = 4 \longrightarrow$$

$$(v+2)\left(t - \frac{1}{6}\right) = 4$$

$$t = \frac{4}{v} \quad \text{substitution}$$

$$(v+2)\left(\frac{4}{v} - \frac{1}{6}\right) = 4$$

$$(v+2)\left(\frac{4 \cdot 6}{v \cdot 6} - \frac{1 \cdot v}{6 \cdot v}\right) = 4$$

$$(6v)(v+2)\left(\frac{24-v}{6v}\right) = 4(6v)$$

$$(v+2)(24-v) = 24v$$

$$0 = v^2 + 2v - 48$$

$$0 = (v+8)(v-6)$$

$$v = -8, 6$$

$$6 \text{ km/h}$$

16. A group of students are to pay equal amounts to a total of £72. However, Leanne, Josh and Andrew have successfully argued that they should not pay, in which case the others would each have to pay an extra £4. How many people were there in the group?

x = # of students in the group
 y = amount each student pays in £

$$xy = 72$$

$$(x-3)(y+4) = 72$$

$$y = \frac{72}{x}$$



#18 from last night

Two chair manufacturers have been in competition for many years. Chair One had to fulfill an order for 810 chairs within a set time, while Chair Two had to fulfill an order for 900 chairs in the **same amount of time**. Competition led these companies to complete the task 3 days and 6 days in advance respectively. We know Chair One makes 4 chairs less, per day, than Chair Two. How many chairs does each make per day, usually?

Let x = # of chairs that Chair One usually makes per day, and let d = # days normally

If they took three days less than usual: $x(d-3) = 810$

$$x = \frac{810}{d-3}$$

Let $x+4$ = # chairs that Chair Two usually makes per day with d = # days normally $(x+4)(d-6) = 900$

substitution: $\left(\frac{810}{d-3} + 4\right)(d-6) = 900$
simplify: $\left(\frac{810}{d-3} + 4\right) \rightarrow \left(\frac{4d+798}{d-3}\right)(d-6) = 900$
multiply by $(d-3)$: $(4d+798)(d-6) = 900(d-3)$

$$\frac{810}{d-3} + \frac{4(d-3)}{d-3} \rightarrow \frac{4d+798}{d-3}$$

$$d^2 - 31.5d - 522 = 0$$

Quadratic formula: $d = \frac{-12}{2} \pm \sqrt{\frac{12^2}{4} + 522}$
43.5 days

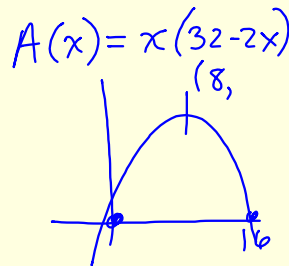
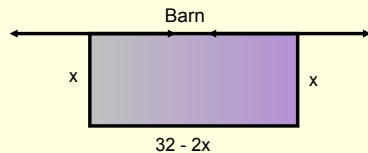
$$x(43.5-3) = 810$$

$x = 20$ chairs for Chair One
and 24 chairs for Chair Two.

More practice with geometric maximization modeling problems.

A farmer has 32 meters of fencing material to use to make a fence around his rectangular garden. He plans on using the side of his barn for one side of the fence. To maximize the area, what should the dimensions be?

Draw the situation, and label the sides.



$$A = x(32 - 2x)$$

parabola, x-int: (0, 0) and (16, 0)

HW: p. 73 # 2, 3,
5, 9, 12

Bring PC book tomorrow.

Test part 2: Friday

Covers: PC 2 and SL 3, 5, & 6

15. A train travels at a constant speed for 120 km. Had the train been travelling 5 kmh^{-1} faster, it would have completed the journey 20 minutes earlier. How long would it take the train to travel 120 km?

$r = \text{rate in } \frac{\text{km}}{\text{h}}$
 $t = \text{time in hrs.}$

$$rt = 120$$

$$r = \frac{120}{t}$$

$$(r+5)\left(t - \frac{1}{3}\right) = 120$$

⋮
 ↓

→ 20 minutes = $\frac{1}{3}$ hour

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19. The local council has sent out two teams to complete work on a stretch of road. Team A works on the left lane while team B works on the right lane. Although Team B started one day after Team A, each team did manage to repair a 10 km stretch of the road. The teams daily joint quota was 4.5 km per day. How many kilometres per day did
- (a) Team A repair?
 (b) Team B repair?

a)

Let a = # km per day team A repairedlet d = # days team A worked

$$\left. \begin{array}{l} ad = 10 \\ d = \frac{10}{a} \end{array} \right\}$$

4.5 - a = # km per day team B repaired $d - 1$ = # days team B worked

$$\left. \begin{array}{l} (4.5 - a)(d - 1) = 10 \\ (4.5 - a)\left(\frac{10}{a} - 1\right) = 10 \end{array} \right\}$$

$$a(4.5 - a)\left(\frac{10 - a}{a}\right) = 10a$$

So Team A repaired
 2 km of road
 each day and

b) Team B repaired 2.5

$$a = \cancel{22.5}, 2$$

$a < 4.5$

 $d = 5/9$ or 4 but $5/9$ won't work (why?)So team A worked 4 days, and they did $10/4 = 2.5$ km each day.

b) 2 km each day